3.—Description of a new Stonefish of the family Synanceidae from Western Australia

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A new species of the genus *Inimicus*, belonging to the family Synanceidae from Western Australia is described and compared with other members of the genus. Notes on the ecology including an account of the severity of the sting of the new species are included.

Introduction

During the years 1958, 1960 and 1962 the Western Australian Fisheries Department obtained a large collection of fishes as a result of the resource surveys carried out by the research vessels *Lancelin* and *Peron*. The majority of the fish were collected in the Shark Bay and Exmouth Gulf areas. Over the past five years, the author has devoted much of his spare time to the study of certain groups of this collection.

The Western Australian coastline is poorly known ichthyologically, and therefore it is not surprising to find that much of the collected material is not recorded from the State, and that a few species are found to be new.

This paper presents the description of one of the species considered to be new. The opportunity has also been taken to record information on the ecology of the species.

Genus **Inimicus** Jordan and Starks, 1904

Genotype *Pelor japonicum* Cuvier, 1829

Inimicus cirrhosus† species nova

Inimicus didactylus; Mees 1960, p. 19.

Differential diagnosis

Differs from all others of the genus in the possession of yellow spots on the inner surface of the pectoral fin.

Description

The description is based on the holotype and fifteen paratypes. The counts and measurements within the parenthesis are those of the paratypes. D. III XIV, 9 (III XIII-XV, 8-10). A. II, 12. (II-III, 12-13). P. 1, 6, 3 + 2 12 (1 — 2, 5 — 6, 3 — 4 + 2 — 3). V. I, 5. (I, 5). C. 2, 9, 3 14 (2 — 3, 8 — 9, 3 — 4 13 — 14). Gill rakers 2 + 7.

Head 2.9 (2.7 — 3.2); depth of body 3.4 (2.6 — 4.0); pectoral fin 2.8 (2.5 — 3.1), all in standard length. Eye 5.4 (5.0 — 7.0) in head, 1.5 (1.4 — 2.1) in interorbital, 2.6 (2.4 — 3.3) in snout.

Interorbital 1.8 (1.4 — 1.8) in snout, 3.6 (3.0 — 4.0) in head. Snout 2.0 (2.0 — 2.5) in head. Longest dorsal spine 1.5 (about 1.5) in head.

Head about as wide as long, snout greater than postorbital part of head, and almost half length of head. Head grotesquely shaped, depressed. Bony orbits elevated and prominent, with 2 or 3 low blunt knobs superiorly. A groove immediately below eye, preorbital pits shallow, interorbital space deeply concave with transverse ridge branching on to orbits at rear. A deep transverse depression behind eyes, nuchal and post-temporal spines developed. One anterior and two posterior spines on suborbital stay. Coronal ridges on snout more or less developed in smaller examples, well developed in larger specimens.

Preorbital with two blunt spines on upper surface, ending in a sharp spine normally covered with skin. Nostrils low and tubular; anterior pair situated on each side of nasal hump or protuberance; posterior pair situated behind this protuberance. Preopercle with 4 spines; lower 2 blunt and scarcely worthy of being called spines; upper 2 sharp, superior spine with a ridge preceding. Opercle terminating in a fleshy flap; upper portion of opercle with 2 well developed radiating ridges, uppermost ending in a spine.

Mouth small, oblique; lower jaw projecting, with a small symphysial knob at tip. Maxillary with posterior end expanded; width posteriorly almost equal to eye diameter. Maxilla ends well before eye. Mandibulary ramus expanded posteriorly.

Teeth small, sharp, and conical; 4-5 series in both jaws, fewer posteriorly; similar teeth in 4-5 series on vomer. Palatines toothless. Tongue triangular, free at tip, upper surface smooth generally with few low tubercles near margin.

Gill rakers 1 — 3 + 7 — 8, low, knoblike and intensely spiniform.

Branchiostegal rays 7. Gill membranes united to isthmus but not broadly so.

Body elongate, little compressed, tapering posteriorly almost in a straight line along dorsal surface from 4th or 5th dorsal spine.

The 3 anterior dorsal spines almost detached from the rest of fin, with membrane almost to their tips. Remaining 13-15 spines, except last 1 or 2, have interspinous membrane low. Dorsal spines sharp, slender and strong, grooved at tips, skin reaches tips of spines in most examples. All spines except first 3 and last 3, almost uniform height. Dorsal rays decrease in length posteriorly, last ray connected to caudal peduncle by membrane, only tip free. Anal fin low, spines sharp but embedded in thick skin. Tips of anal rays slightly thickened, free for about one-third of their length, last 3 with membrane to tips.

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† From the Greek kirrhos, yellow.

Pectoral fin large, extending well past origin of anal. First 1 or 2 and last 5 or 6 pectoral rays simple, intermediate ones branched. Lower 2 pectoral rays free, for the most part; generally curved, thickened slightly, and almost equal in length. Length of ventral fin almost equal to that of head, adnate to belly with free tips of the rays reaching well beyond anus.

Caudal fin rounded, length almost equal to that of head, outermost 2 or 3 rays normally simple. Caudal peduncle less than interorbital measurement.

Body and head without scales. Skin loose, with dermal flaps, filaments, skinny tentacles and branched appendages, especially on head, chin, mandibles, margins of preopercle and pectoral fin, and upper surfaces of sides and back. Well developed branched dermal appendages on each side of chin, placed low on preopercle margin.

A somewhat obscure lateral line present with 12 to 13 pores along its length. A few pores above lateral line near dorsal surface; all pores have small mostly branched dermal appendages.

Colour

Body and head generally brownish, densely mottled with lighter and darker diffuse blotches and variable marblings. Holotype deep brown with areas of lighter brown and patches of grey-white near 1st, 4th, 5th and 10th to 15th dorsal spines, extending below lateral line; a pale diffuse bar through soft dorsal fin. Lower sides and belly with numerous scattered light and dark flecks and diffuse blotches. Ventrals uniform brown. Caudal with 2 vague narrow whitish cross-bars or two rows of white spots (in life, yellow).

Pectoral fin dark brown, almost black with indistinct pale cross-bars and variable blotches on outer surface. Inner surface dark brown to blackish, with 20 to 35 white (in life bright yellow) spots of indefinite shape. In larger examples the yellow spots are more diffuse and frequently in the form of ocelli. (Fig. 1a).

Base of pectoral fin, and lower sides of belly above ventral fins, pale with brown flecks and indistinct marblings.

One paratype has body yellowish with scattered brown spots on body and a few dark spots on head; dorsal fin plain yellow. Caudal brownish with scattered dark brown and yellow spots. Lower portions of body brownish with some scattered dark spots. Ventrals brownish with a few scattered darker spots. Outer surface of pectoral fin yellow with scattered dark brown spots. Inner surface of pectoral fin brownish with yellow spots, about eye diameter in size; 2 to 3 rows of smaller dark brown spots near margin of fin, and a few scattered dark spots on fin, especially near base.

Material Examined

Unless otherwise stated, all Western Australian Museum material was taken by trawl net on the State Fisheries Research Vessels *Lancelin* and *Peron*, collected by the author. Western Australian Museum and Australian Museum registered material is abbreviated WAM and AM respectively.

I. cirrhosus

Holotype.—WAM P 4980 164 mm total length, 125 mm standard length, approx. 9 miles north of Cape Peron Flats, Shark Bay, 1.X.1960.

Paratypes.—WAM P 4983 198 mm t.l., 155 mm s.l., Exmouth Gulf 14.XI.1960; P 4987 322 mm t.l., 256 mm s.l., Rat Island, Abrolhos Is., 2.III.1963 hand spear whilst diving in 9 fathoms; 13 specimens from Shark Bay collected between 23.V.1960 and 27.X.1960 WAM P 4981, P4982,

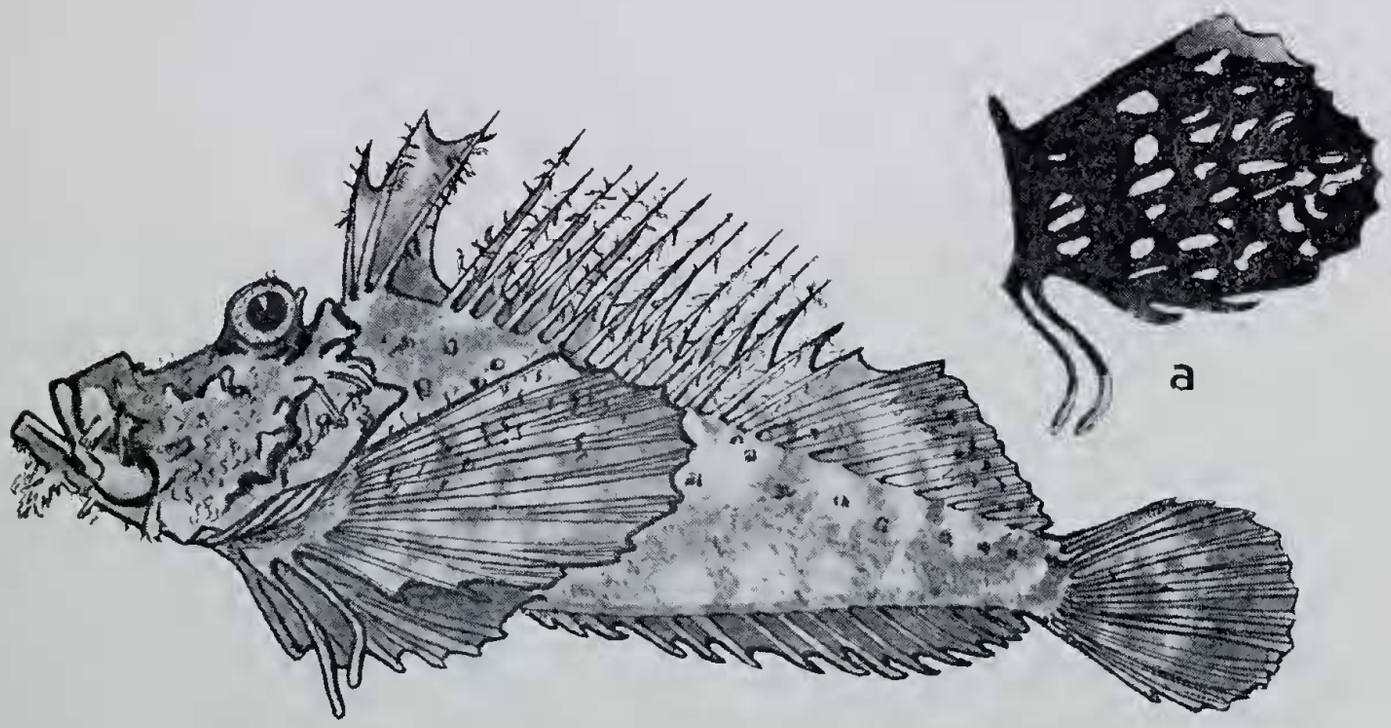

Fig. 1. *Inimicus cirrhosus*. a. Inner surface of pectoral fin showing markings.

P 4984, P 4985, P 4986 and P 4988 to P 4995 inclusive, range of measurements 75 to 257 mm t.l., 56 to 203 mm s.l.

Other species

I. didactylus (Pallas) AM 1B.4439 and 1.1499, 2 specimens.

I. japonicus (Cuvier) AM 1.13702, 1 specimen.

I. barbatus (De Vis) AM 1A.4782, 1A.6137, 1A.6671, 1A.6672, 1.14039, 1.10933 and 1B.1716, 7 specimens.

Distribution

Known from Exmouth Gulf, Abrolhos Islands and the type locality, Shark Bay.

Comparison with Other Species

Inimicus cirrhosus appears closest to *I. didactylus* and *I. barbatus*, their structural details and body proportions being very similar.

On examining the two specimens of *I. didactylus* at the Australian Museum, it was found, as McCulloch (1916, p. 197) noted, that the coloration and markings of the inner surface of the pectoral fin agreed with Bleeker's (1874, pl. IV, figs. 1-1A. 1878, pl. CCCCXIV, figs. 5-5a) plates of this species.

The specimens of *I. barbatus* have the coloration and markings of the inner surface of the pectoral fin as McCulloch (1916, pl. LVIII) figured.

Bleeker (1874, p. 1) and McCulloch (1916) have remarked on the importance of the coloration and markings on the inner surface of the pectoral fin in determining species of *Inimicus* as these are consistent within a species. This is true for *I. cirrhosus*, as over 200 specimens were checked from Shark Bay and Exmouth Gulf during 1958, 1960, and 1962.

The 2 specimens of *I. didactylus* examined had the eye equal to the interorbital space, and in *I. cirrhosus*, the eye in interorbital space ranged from 1.4 to 2.1. Herre (1951, p. 472) records the eyes as being about a diameter apart in Philippine specimens of 48 to 128 mm in length. Fowler (1927, p. 288) gives eye as 2 in interorbital in a Philippine specimen of 183 mm, while Day (1878, p. 161) gives eye as 1-1¼ apart in a specimen of 5½ inches from the Andaman Islands. McCulloch (1916) records variation in interorbital space for *I. barbatus*, being narrower in smaller examples; this is generally so in *I. cirrhosus* (see Table 1).

Bleeker (1878, pl. CCCCXVI, figs. 3-3a) shows the pectoral fin markings of *I. cuvieri* (Gray) and on pl. CCCCXIII, figs. 1-1a, the pectoral fin markings of *I. brachyrhynchus* (Bleeker). The pectoral fin markings of *I. maculatus* (*I. didactylus*), and *I. filamentosus* (Cuvier) were also figured. Published descriptions by Günther (1860, p. 150), Herre (1951, p. 470 and p. 473), and Fowler (1927, p. 289; 1928, p. 299) agree with Bleeker's plates.

The specimen of *I. japonicus* examined has the eye 2.0 in interorbital, snout 2.7 in head, and the postorbital part of head (25 mm) is greater than the snout (19 mm). Günther (1860, p. 151), gives eye as 2.5 in interorbital, and an anal ray count of 9, for this species, while Tanaka (1914, p. 248) records counts of 7 dorsal and 9 anal rays in a specimen of 220 mm, and gives snout as 2.5 in head.

Smith (1958, p. 276) records D. as III XII, 8, A. III, 8, "and pectoral and caudal with middle parts light" for *I. filamentosus*. Fowler (1938, p. 36) gives coloration of pectoral fin of *I. bifilis* (Fowler) as having "broad white subbasal band, adjoining blackish area over branched rays and another terminally; lower detached rays with dark spots". *I. bifilis* has a dorsal count of XVII, 8, and an anal count of 13.

I. caledonicus (Sauvage) has a dorsal ray count of 7, and a total anal count of 12. (Fowler 1928, p. 299, (after Sauvage)).

Variation in Pectoral Rays

Paratype WAM P 4994 has 3 free pectoral rays on the right hand fin, the first 2 are joined for half their length; the left hand pectoral fin has the normal 2. The joined pectoral rays in this specimen number 9 instead of the usual 10.

TABLE I

Measurements in mm and fin ray counts of *I. cirrhosus*

	P.4980	P.4981	P.4982	P.4983	P.4984	P.4985	P.4986	P.4987	P.4988	P.4989	P.4990	P.4991	P.4992	P.4993	P.4994	P.4995
Total length	164	191	220	198	257	209	238	322	98	75	133	116	99	121	155	136
Standard length	125	150	180	155	203	167	190	256	75	56	106	90	77	93	119	106
Length of head	43	52	62	52	76	54	60	88	25	21	33	31	25	32	42	37
Length of snout	21	25	29	23	34	26	28	39	12	10	16	14	12	14	20	15
Diameter of eye	8	9	10	9	10	9	11	13	4	4	6	5	5	5	6	6
Interorbital	12	14	18	13	19	16	17	27	7	6	11	8	7	10	11	10
Greatest body depth	37	43	58	48	79	50	56	81	20	16	32	24	23	23	23	29
Length of pectoral fin	45	49	60	53	70	59	62	83	30	21	37	32	26	30	45	41
Length of upper free pectoral ray	39	30	35	28	41	32	39	57	15	13	20	16	16	18	17	23
Length of lower free pectoral ray	40	32	32	31	13	31	39	62	16	13	23	19	16	17	19	23
Soft dorsal base	32	37	47	40	50	47	39	67	20	14	26	22	21	20	28	30
Anal base	54	61	78	69	93	80	84	114	35	27	50	37	38	44	53	52
Ventral base	35	37	45	42	61	47	49	71	20	16	27	26	22	25	38	33
Depth of caudal peduncle	11	11	13	12	12	12	14	20	6	5	8	8	6	7	8	9
No. of dorsal rays	9	9	9	9	8	10	9	9	9	9	9	9	9	8	8	9
No. of anal rays	12	12	12	12	12	13	13	12	12	13	12	12	12	12	12	12
No. of caudal rays	14	13	13	14	13	14	14	14	14	14	14	13	14	14	14	14

Paratypes WAM P 4988 and P 4989 have the two uppermost pectoral rays filamentous at their tips, the rays extend 8 mm and 12 mm from the tip of the pectoral fin respectively. Paratype WAM P 4922 has only the upper pectoral ray filamentous; this ray extends 18 mm from the pectoral fin membrane, 7 mm from the tip of the pectoral fin. This condition apparently exists in the juveniles as these 3 paratypes measure 75, 56, 77 mm in s.l. respectively.

In view of these observations of the juvenile characters of *I. cirrhosus*, it is possible that some "species" with similar characters may be juveniles of other species. The type of *I. bifilis* from the Philippines measures only 57 mm in length and Fowler remarks "Greatly like *Inimicus filamentosus*, but only the uppermost pectoral ray ending in a filament which reaches well beyond the depressed pectoral fin". This could be a juvenile condition of perhaps *I. cuvieri* or *I. didactylus* which have been recorded from the Philippines by Herre (1953, p. 576).

General Biology and Ecology

I. cirrhosus was found to be a sluggish, bottom-dwelling marine form inhabiting open, sandy, or silty types of substrates. Inside Shark Bay, it has a wide distribution and is commonly taken on prawn trawling grounds, often in association with Scallops *Amusium balloti* Bernardi. Two or 3 per haul are not uncommon. The greatest number recorded inside Shark Bay during 1962 was 14 during a 45-minute trawl.

During 1961, F.R.V. *Peron* used a temperature-chlorinity conductivity meter, and specimens of *I. cirrhosus* were collected in salinities ranging from 35.7‰ to 44.9‰, and temperatures from 18.2°c. to 26.4°c. The depths recorded on the echo sounder were between 7 and 12 fathoms.

Partly digested fish were found in the stomachs of 2 specimens; these were identified as *Monacanthus sp.* and *Equula fasciata* (Lacepede).

A near-ripe female, t.l. 215 mm, was trawled inside Exmouth Gulf early in October, 1958. One ripening female t.l. 220 mm trawled inside Shark Bay early in February, 1962, had ova 0.8 mm in diameter, and 3 females, t.l. 210 to 265 mm were found to be spent during May, 1962.

Like other members of the family *Synanceidae*, they are reluctant to move when approached, and lie quite motionless, even when spilled from the trawl net on the deck of the vessel. One was taken underwater and the fish made no attempt to move, but quickly spread the dorsal spines to afford protection from most directions. The pectoral fins were extended to show the markings on their inner surface. The fish was not easily recognised in its natural surroundings, as it was covered to some extent by fine sand, and appeared quite hirsute due to the dense covering of dermal cirri and appendages.

Notes on Severity of Sting

This species is capable of inflicting an extremely agonising wound. The following notes were made early in October, 1960, after the author was stung on the thumb. The pain was immediate and intense, the wound bled very freely for a few minutes then ceased. Bleeding was difficult to restart. Pain became rapidly unbearable.

1145 hrs. While sorting a trayful of fish emptied from trawl 31, left thumb deeply penetrated by dorsal spine of *Inimicus*. Bleeding freely.

1150 hrs. Bleeding stopped.

1155 hrs. Thumb swollen, area around wound becoming grey-blue in colour, extremities of fingers becoming very painful, pain in thumb almost unbearable. Elbow and shoulder now aching.

12 midnight. Sweating profusely, thumb and hand swollen, wrist very stiff, area around wound bluish, throat and mouth dry.

0005 hrs. Became delirious, do not remember much, but can recollect throwing myself about the cabin in fearful pain. Crew members restrained my movements for the next 30 minutes, during which I was screaming and complaining of pains around chest and neck.

0045 hrs. Regained full consciousness, the pain in arm and shoulder very agonising.

0115 hrs. Hand and thumb immersed in hot water and sedatives taken.

0200 hrs. Pain still present but greatly diminished.

Thumb remained stiff and swollen for four days, but the pain had subsided 12 hours after encounter. Bathing the wound with hot water greatly reduced pain, but when the water became cool enough to be comfortably borne, the pain returned. A tourniquet was not applied.

Stings by fishes such as Scorpaenids *Paracentropogon vespa* (Ogilby), *Apistus carinatus* (Bloch) and *Minous monodactylus* (Bloch & Schneider), and a stingray *Amphotistius kuhlii* (Müller & Henle) were quite common on board prawn trawlers operating inside Shark Bay. From personal experience, the sting of *I. cirrhosus* is considerably more painful than any of these species.

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